

● Description

The KAQY214 series is robust, ideal for telecom and ground fault applications. It is a SPST normally open switch (1 Form A) that replaces electromechanical relays in many applications. It is constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuitry and MOSFET switches.

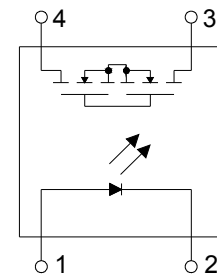
● Features

1. Normally open, single pole single throw
2. Control 400V AC or DC voltage
3. Switch 130mA loads
4. Controls low-level analog signals
5. High sensitivity, low ON resistance
6. Low-level off-state leakage current
7. High isolation voltage 5KV (DIP / SMD)
8. Pb free and RoHS compliant
9. MSL class 1
10. Agency Approvals :
 - UL Approved (No. E108430): UL508
 - c-UL Approved (No. E108430)
 - FIMKO Approved: EN60950

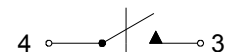
● Application

- Telecommunications (PC, electronic notepad)
- Modem
- Telephone equipment
- Security equipment
- Sensors
- Measuring and testing equipment
- Factory automation equipment
- High speed inspection machines

● Schematic



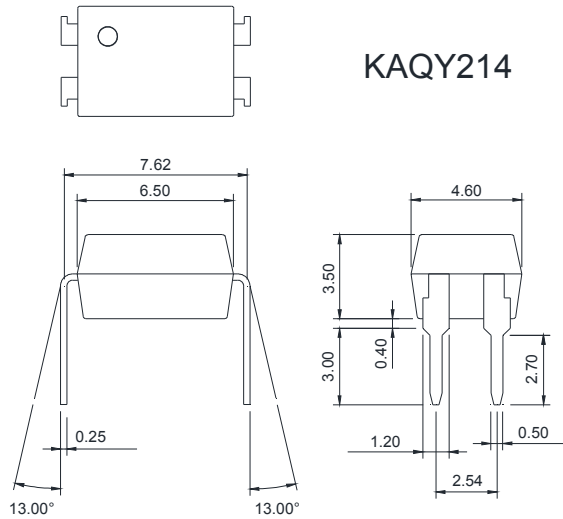
1 FORM A
NORMALLY OPEN



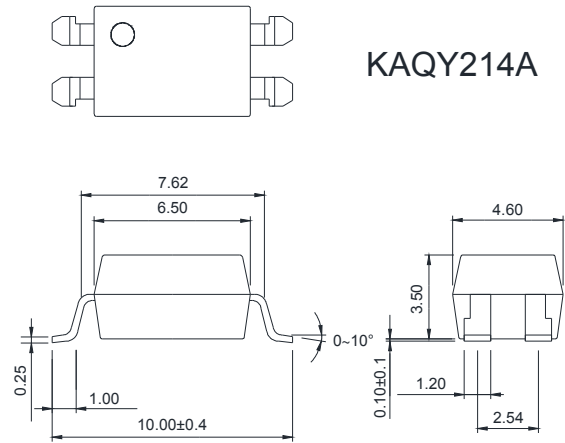
● **Outside Dimension**

Unit : mm

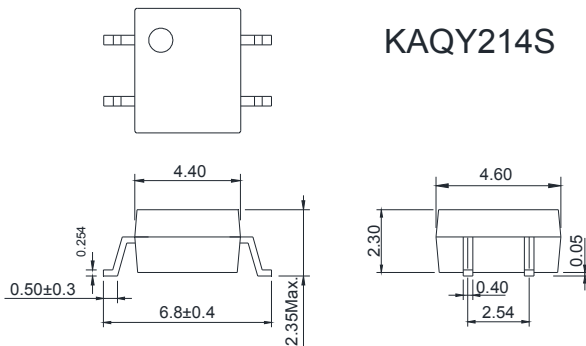
1. Dual-in-line type.



2. Surface mount type.



3. Small outline for surface mount type.



TOLERANCE : ±0.2mm

● **Device Marking**



Notes :

COSMO

Y214 □

YWW

□ : Pin forming

Y : Year code / W : Week code

● **Absolute Maximum Ratings**

(Ta=25°C)

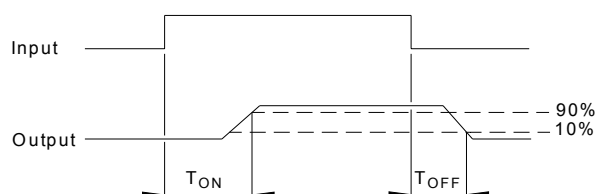
| Item | | Symbol | Rating | Unit |
|----------------------------------|----------------------------|-----------|-----------------|----------------|
| Input | Continuous forward current | I_F | 50 | mA |
| | Peak forward current | I_{FP} | 1 | A |
| | Reverse voltage | V_R | 5 | V |
| | Power dissipation | P_{in} | 100 | mW |
| | Derate linearly from 25°C | - | 1.3 | mW/°C |
| Output | Breakdown voltage | V_B | 400 | V |
| | Continuous load current | I_L | 130 | mA |
| | Power dissipation | P_{out} | 500 | mW |
| Isolation voltage | | V_{iso} | KAQY214S | KAQY214 |
| | | | 1500Vrms | 5000Vrms |
| Isolation resistance (Vio=500V) | | R_{iso} | $\geq 10^{10}$ | Ω |
| Total power dissipation | | P_t | 550 | mW |
| Derate linearly from 25°C | | - | 2.5 | mW/°C |
| Operating temperature | | T_{opr} | -40 to +85 | °C |
| Storage temperature | | T_{stg} | -40 to +125 | °C |
| Junction temperature | | T_j | 100 | °C |
| Soldering temperature 10 seconds | | T_{sot} | 260 | °C |

● **Electro-optical Characteristics**

(Ta=25°C)

| Parameter | | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|------------|----------------------------|------|------|------|----------|
| Input | Forward voltage | V_F | $I_F=10mA$ | - | 1.2 | 1.5 | V |
| | Operation input current | I_{FON} | $V_L=20V, I_L=100mA$ | - | - | 3.0 | mA |
| | Recovery input current | I_{FOFF} | $V_L=20V, I_L \leq 5\mu A$ | 0.2 | - | - | mA |
| Output | Breakdown voltage | V_B | $I_B=50\mu A$ | 400 | - | - | V |
| | Off-state leakage current | I_{LEAK} | $V_L=400V, I_F=0mA$ | - | 0.2 | 1.0 | μA |
| I/O capacitance | | C_{iso} | $V_B=0V, f=1MHz$ | - | 6 | - | pF |
| ON resistance | | R_{ON} | $I_F=10mA, I_L=100mA$ | - | 20 | 30 | Ω |
| Turn-on time | | T_{ON} | $I_F=10mA, V_L=20V$ | - | 0.3 | 1.0 | ms |
| Turn-off Time | | T_{OFF} | $I_L=100mA, t=10ms$ | - | 0.1 | 1.0 | ms |

● **Turn-on / Turn-off Time**



● Schematic and Wiring Diagrams

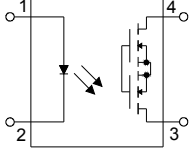
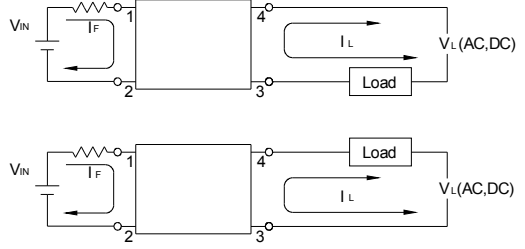
| Schematic | Output Configuration | Load | Connection | Wiring Diagrams |
|---|----------------------|----------|------------|--|
|  | 1a | AC DC | - |  |

Fig.1 Load Current vs. Ambient Temperature

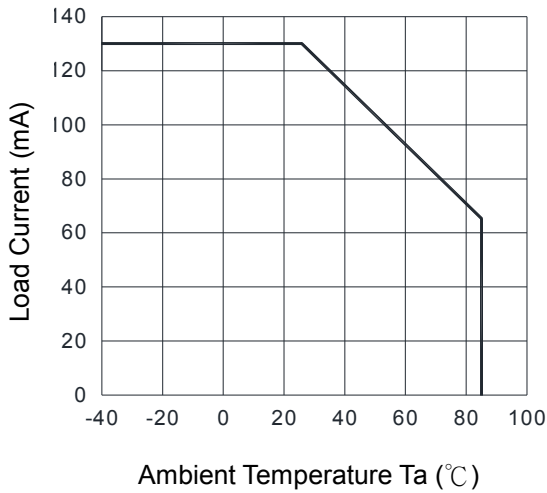


Fig.2 On Resistance vs. Ambient Temperature

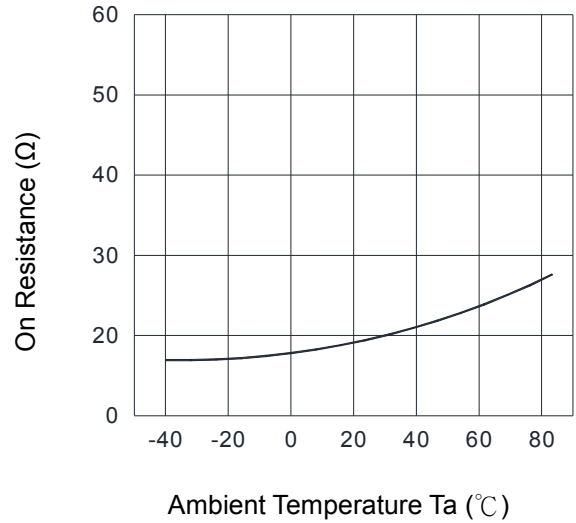


Fig.3 Turn-on Time vs. Ambient Temperature

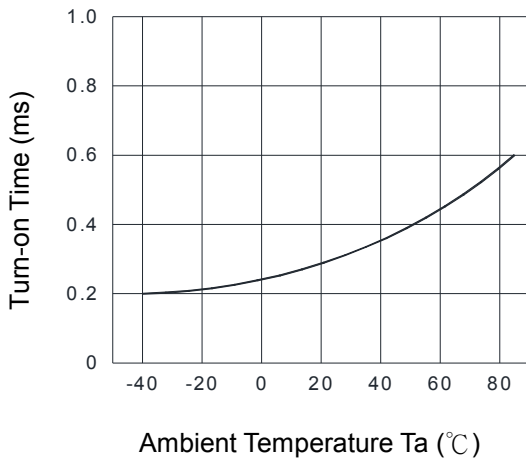


Fig.4 Turn-off Time vs. Ambient Temperature

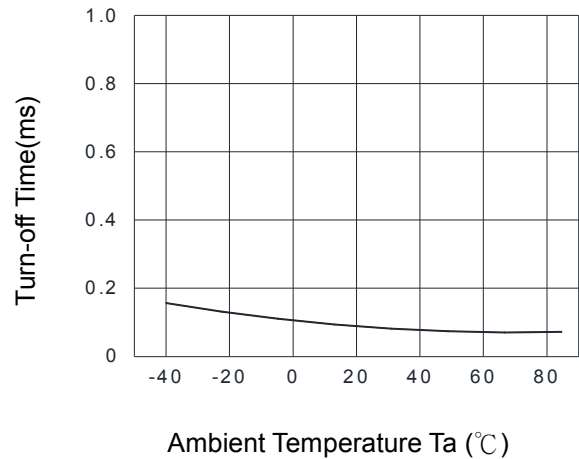


Fig.5 LED Operate Current vs. Ambient Temperature

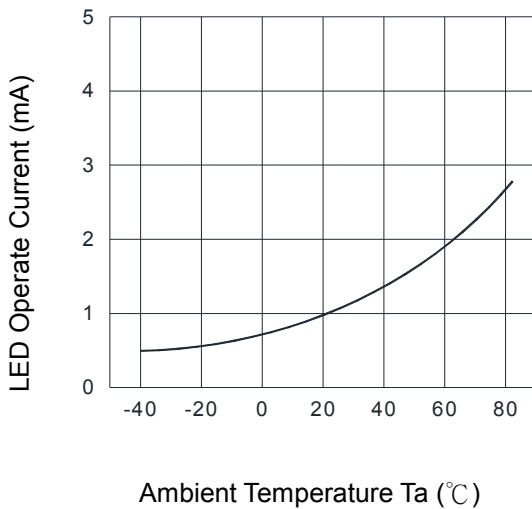


Fig.6 LED Turn-off Current vs. Ambient Temperature

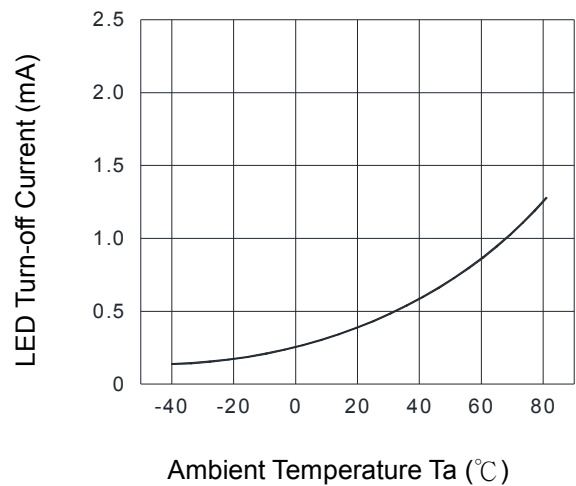


Fig.7 LED Dropout Voltage vs. Ambient Temperature

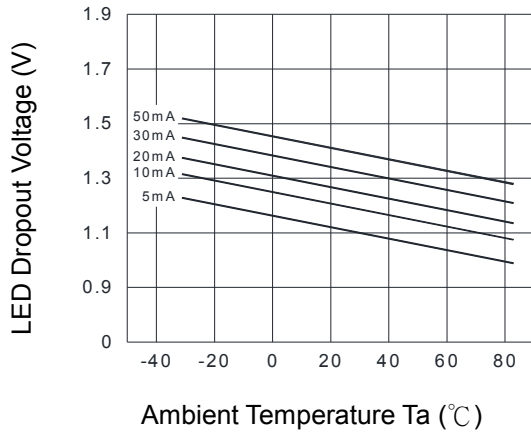


Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion

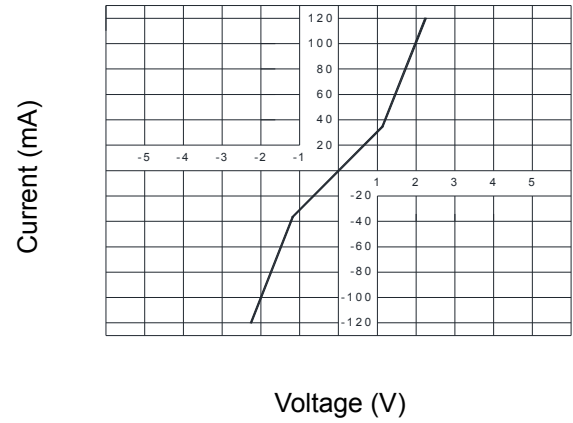


Fig.9 Turn-on Time vs. LED Forward Current

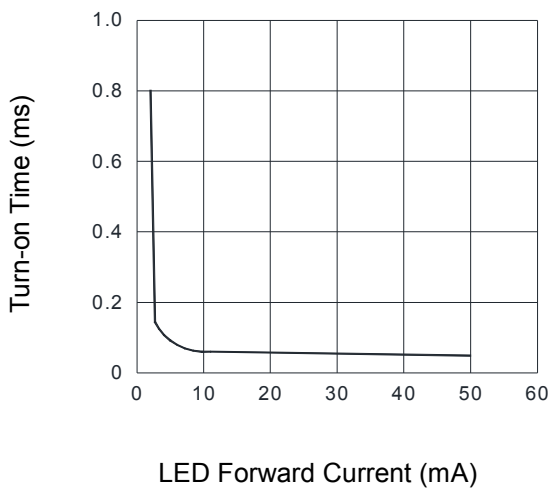


Fig.10 Off-state Leakage Current vs. Load Voltage

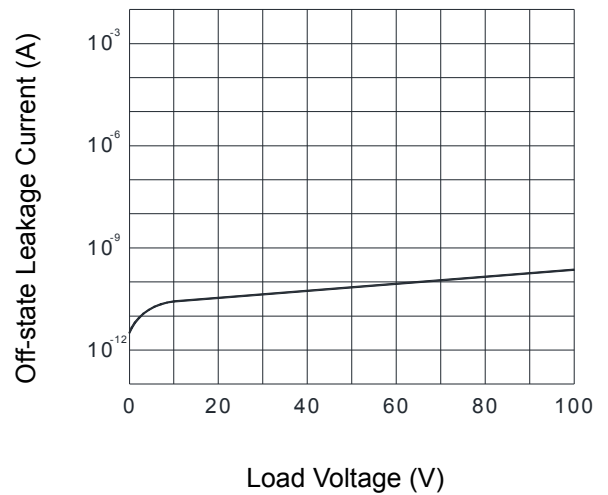


Fig.11 Turn-off Time vs. LED Forward Current

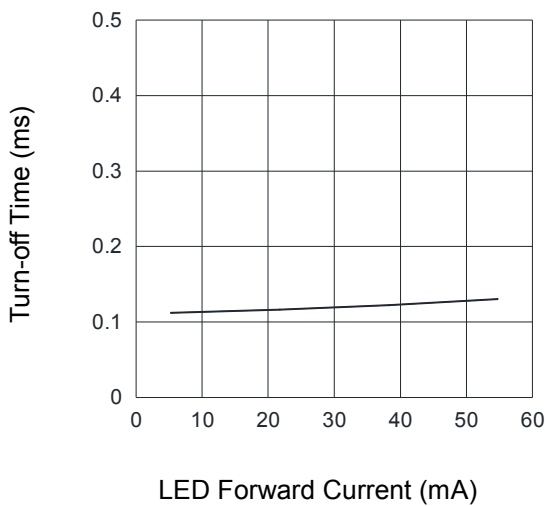
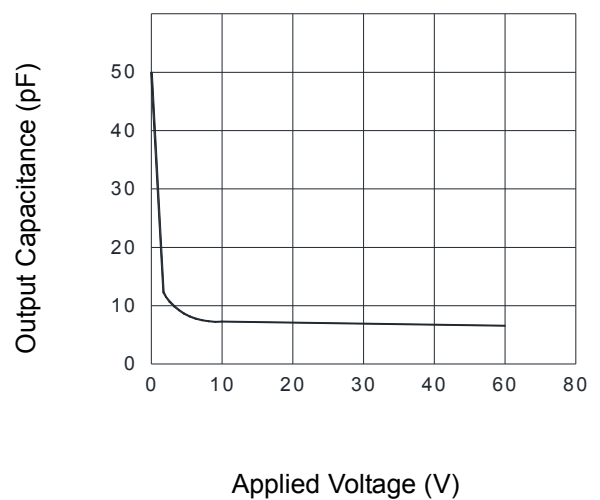
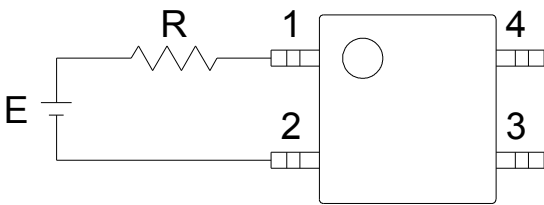


Fig.12 Output Capacitance vs. Applied Voltage



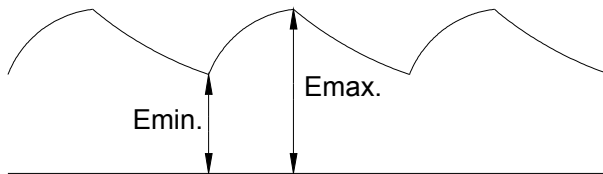
● Using Methods

Examples of resistance value to control LED forward current ($I_F=5\text{mA}$)

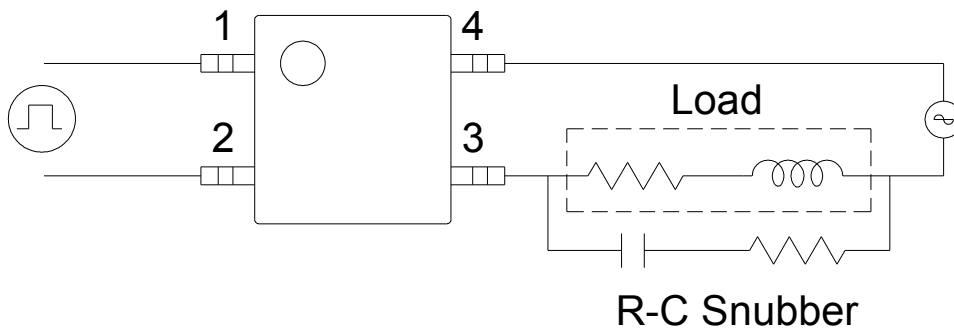
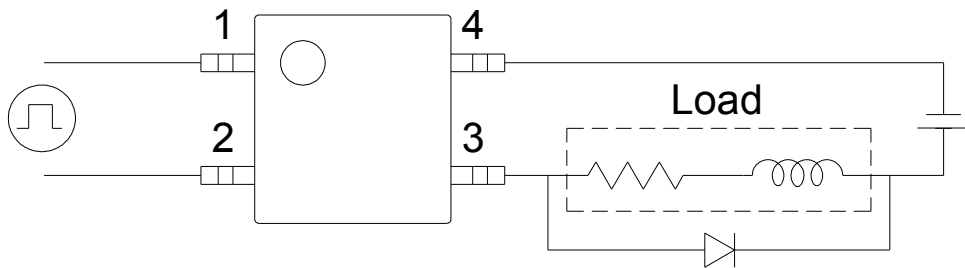


| E | R |
|------|-----------------------|
| 3.3V | Approx. 330 Ω |
| 5V | Approx. 640 Ω |
| 12V | Approx. 1.9K Ω |
| 15V | Approx. 2.5K Ω |
| 24V | Approx. 4.1K Ω |

1. LED forward current must be more than 5mA \cdot at E min.
2. LED forward current must be less than 50mA \cdot at E max.



Regulate the spike voltage generated on the inductive load as follows :

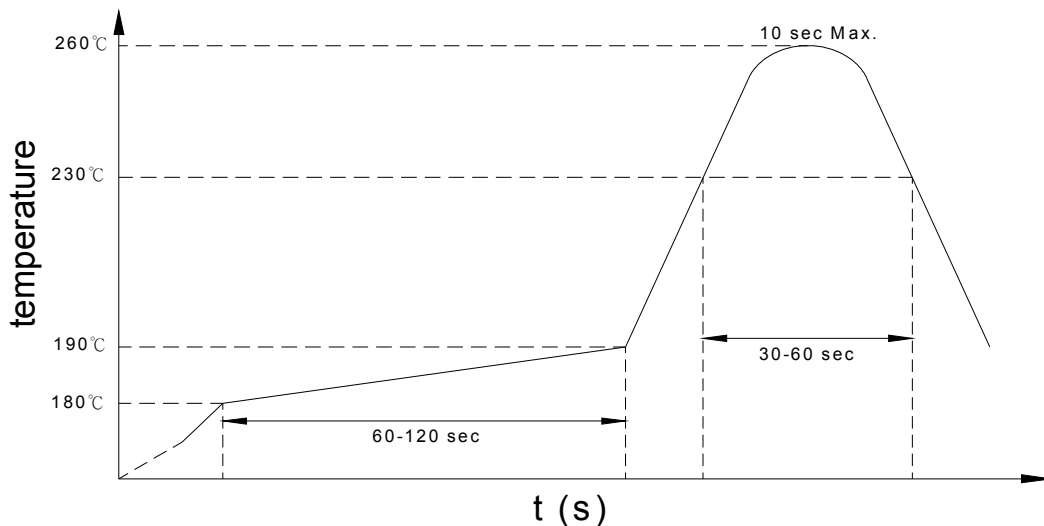


● Recommended Soldering Conditions

(a) Infrared reflow soldering :

- Peak reflow soldering : 260°C or below (package surface temperature)
- Time of peak reflow temperature: 10 sec
- Time of temperature higher than 230°C : 30-60 sec
- Time to preheat temperature from 180~190°C : 60-120 sec
Two
- Number of reflows : Rosin flux containing small amount of chlorine
- Flux : (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(b) Wave soldering :

- Temperature : 260°C or below (molten solder temperature)
- Time : 10 seconds or less
- Preheating conditions: 120°C or below (package surface temperature)
- Number of times : One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) Cautions :

- Fluxes : Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.

● Numbering System

KAQY214 X (Y)

Note :

KAQY214 = Part No.

X = Lead form option (blank · S or A)

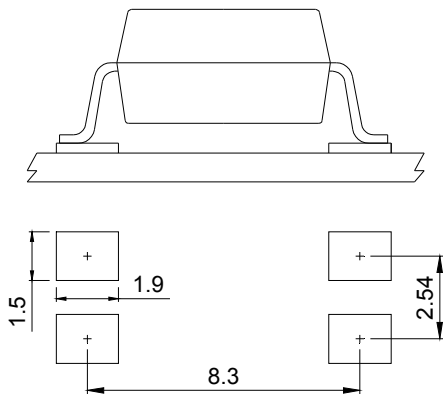
Y = Tape and reel option (TLD · TRU · TL · TR)

| Option | Description | Packing quantity |
|---------|--|---------------------|
| A (TLD) | surface mount type package + TLD tape & reel option | 2000 units per reel |
| A (TRU) | surface mount type package + TRU tape & reel option | 2000 units per reel |
| S (TL) | small outline for surface mount type package + TL tape & reel option | 2000 units per reel |
| S (TR) | small outline for surface mount type package + TR tape & reel option | 2000 units per reel |

● Recommended Pad Layout for Surface Mount Lead Form

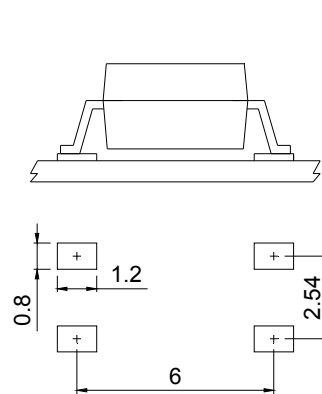
1. Surface mount type.

4-pin SMD



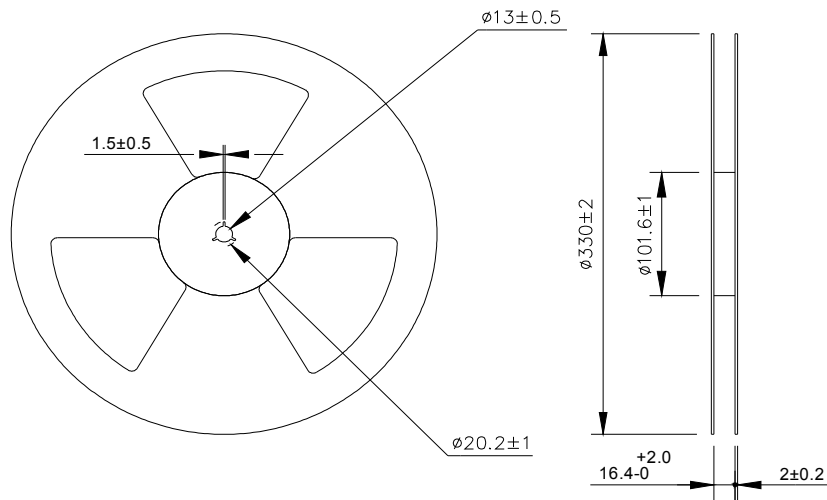
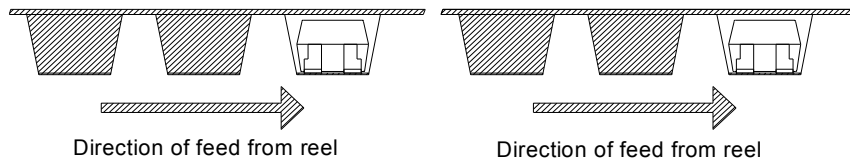
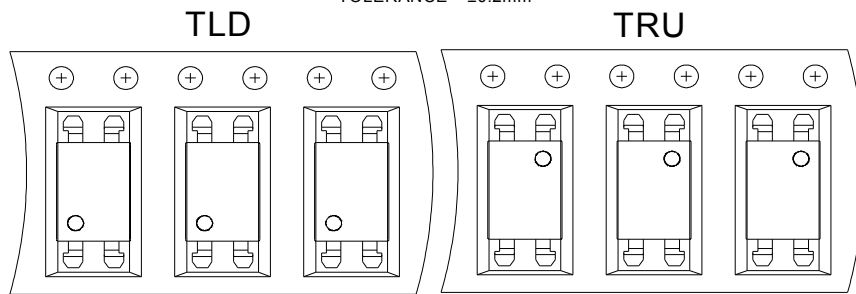
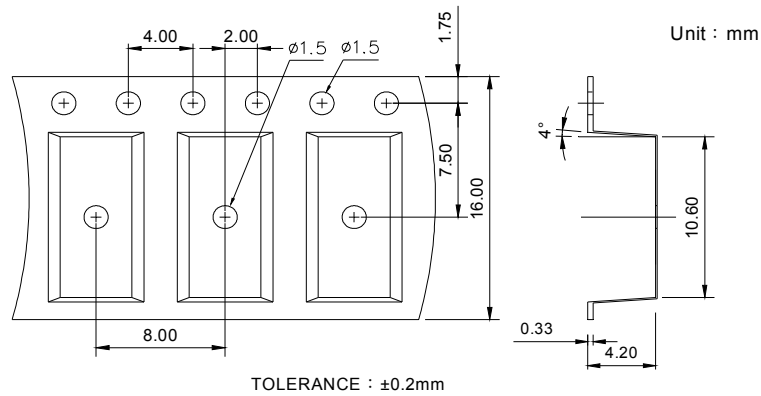
2. Small outline for surface mount type.

4-pin SOP

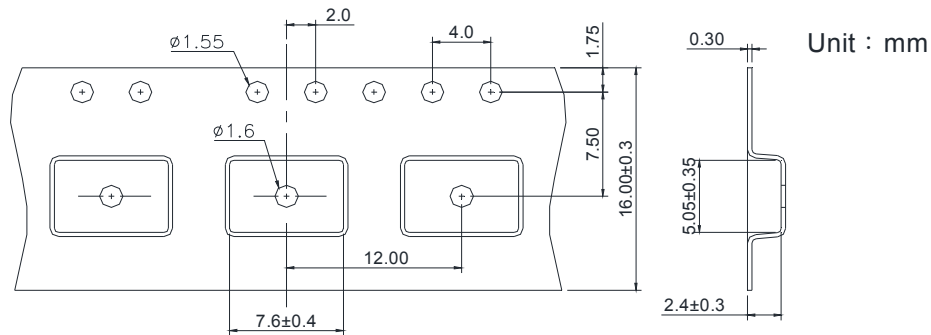


Unit : mm

● 4-pin SMD Carrier Tape & Reel



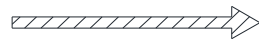
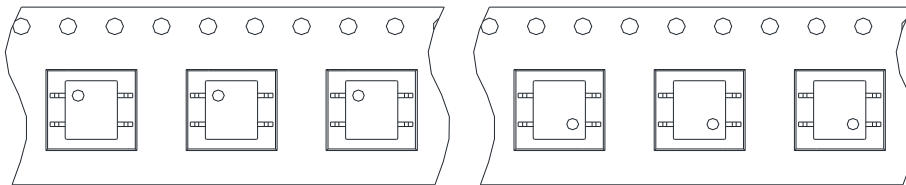
● 4-pin SOP Carrier Tape & Reel



TOLERANCE : ±0.2mm

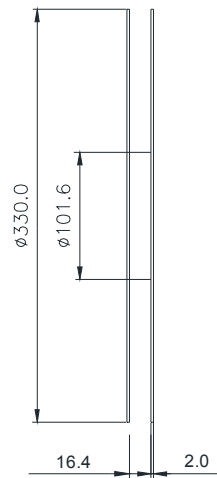
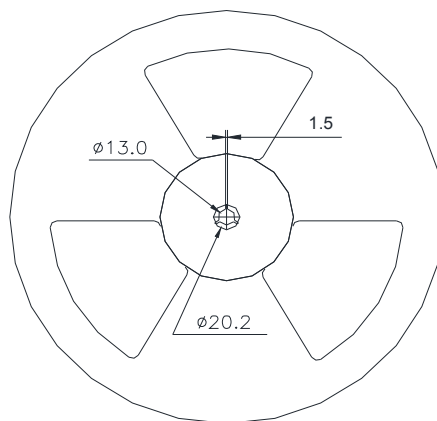
TL

TR



Direction of feed from reel

Direction of feed from reel



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